



**MISSOURI DEPARTMENT OF TRANSPORTATION
CONSTRUCTION-MATERIALS
Jefferson City, Missouri**

**Test Method
MoDOT T 72
Sweep Test of Bituminous Surface Treatment Samples**

1.0 SCOPE. This test method measures the performance characteristics of bituminous material and field aggregates by simulating a surface treatment during the brooming operation.

2.0 APPARATUS.

2.1 Hobart mixer --- The 1/3 H.P. Fixed Speed Motor, model A 120 will be used to abrade the sample

2.2 Quick-clamp mounting base --- This base shall be an adequate and level support for clamping the sample in place. The test sample shall not move during abrasion.

2.3 Pan --- The pan shall be capable of containing the test sample on the Hobart mixer and of holding dislodged aggregate.

2.4 Oven --- The conditioning oven shall be a constant temperature forced draft oven meeting the requirements in Table 1 containing shelves with at least 65% voids. The shelves shall be placed at least 5 inches apart and 4 inches away from the top and floor.

Table 1 - Specifications	
Oven Type	Forced draft oven
Min. Inside D x W x H	18 x 18 x 18 inches
Accuracy	$\pm 1.0^{\circ} \text{ C}$
Uniformity	$\pm 3.0^{\circ} \text{ C}$
Resolution	1° C (max)
Recovery Time @ 35° C	60 sec.

2.5 Balance --- The balance shall be capable of weighing 800g or more to within $\pm 0.1\text{g}$. A minimum platform length and width of 240 mm will be required.

2.6 Removable brush holder --- The brush holder shall be attachable to the Hobart Mixer, shall be capable of a free floating vertical movement of 19 ± 1 mm, shall have dimensions in accordance with those listed in Table 2. The total weight of the brush head and the attached weight shall weigh $1500 \pm 15\text{g}$. The collar and nylon strip brush will not be included in this weight. The brush clamping system shall hold the nylon strip brush in place such that the brush will not move or dislodge during testing.



BRUSH HOLDER

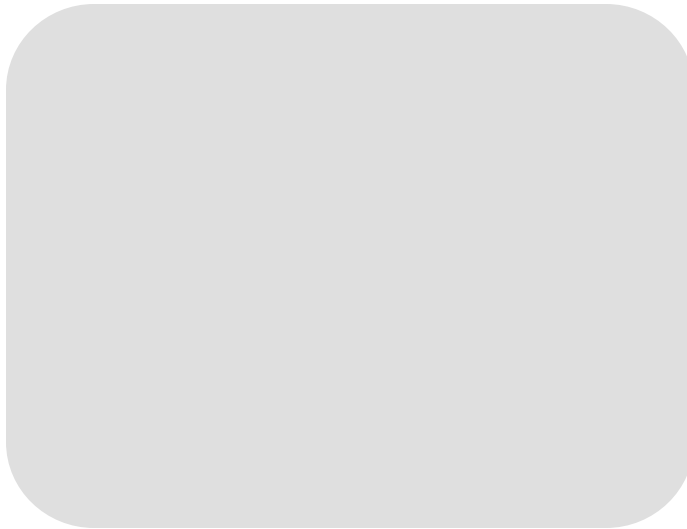


Table 2 - Brush Holder Dimensions		
ID	Name	mm
A	Collar diameter	36
B	Collar height	76
C	Brush head length	128
D	Overall brush head height	19
E	Groove height	17
F	Groove width	18
H	Slot height	19
W	Slot width	7

2.7 Nylon strip brush --- The brush shall be in accordance with the specifications listed in Table 3.

Table 3 - Brush Specifications	
Overall Trim	25.4 mm
Overall Length	127 ± 1mm
Backing Length	50 mm
Backing size	#7
Fill Material	Crimped black nylon
Nylon Type	6.0
Fill Diameter	0.254 mm
Weight	35 ± 2g

2.8 Strike-off template --- The template shall consist of a flat, stainless steel metal. The template shall include a 280 ± 3 mm diameter cut out with a flush edge.

Note: A 16 Ga. US Standard (Plate and Sheet Metal) will suffice in most cases. Bituminous material mass may vary according to material viscosity and applied strike off pressure. Alternative gauges may be necessary for material mass correction.

2.9 Strike-off rod --- The 750 ± 100 mm rod shall be made of 8 mm electrical conduit for striking off bituminous material from the template surface.

2.10 Sweep test compactor --- A suitable compaction device shall have a minimum curved surface radius of 550 ± 30 mm and shall weigh 7500 ± 500 g.

SWEEP TEST COMPACTOR



3.0 MATERIAL.

3.1 Bituminous Material --- The bituminous material shall meet all applicable specifications for the surface treatment application. The bituminous material shall be equilibrated to a temperature of 60 °C for sample production.

3.2 Aggregates --- The aggregates shall be sampled and split in accordance with AASHTO T 2. The aggregates shall be placed in an oven and dried to a constant weight. The amount of aggregate used for each sample shall be in accordance with Table 4 with a tolerance of $\pm 1\%$.

Table 4 - Aggregate Chart	
Bulk S.G. (AASHTO T84-T85)	Agg. Mass per 280 mm dia. Disk (g)
3.25	608
3.00	561
2.75	514
2.50	468
2.25	421
2.00	374

3.3 Asphalt Felt Disk --- Produce sample disks from 30 lb. asphalt felt paper, ASTM D 226 TYPE II. The asphalt felt discs shall not have breaks, cracks, tears, protuberances, indentations or splices. The felt shall be cut to make 300 ± 10 mm diameter disks. The disks shall be placed in a 50°C oven for 24 to 72 hours to flatten. Manipulate the disks until they are flat and store at room temperature at least three days before use.

4.0 Test Specimens. Test specimens shall be prepared as follows.

4.1 Weigh the asphalt felt disk to the nearest 0.1g and record as the *Asphalt Sample Disk Weight*. Place the asphalt felt disk on a flat table. Manipulate the felt disk such that the disk lies flat against the surface. Replace the disk if the edges curl, bubble or the disk contains foreign matter. Pre-weigh the aggregate and record as *Aggregate Weight* (see Table 4 for proper amounts of aggregate). A strike-off template is placed over the disk, centering the felt paper. 58 ± 3.5 grams of residual bituminous material at 60°C is poured along the top arc of the exposed felt disk. Excess bituminous material is removed with the strike-off rod in a gentle side-to-side continuous motion. This shall be completed within a 3 ± 1 second period. The strike-off motion shall not be stopped until excess material is off of the felt disk. The template shall be quickly removed.

Note: Downward pressure, strike-off speed and template thickness can be adjusted to ensure correct bituminous material mass.

4.2 Immediately apply the pre-weighed aggregate sample onto the bituminous material using an even back and forth motion. Once the aggregate has been placed on the sample, compact the aggregates using the sweep test compactor three times in one direction and three times in a perpendicular direction to set the aggregate. Immediately weigh the sample and record as *Sample Weight*. Place the specimen in the forced draft oven. Sample production and weighing shall take no more than 4 minutes.

5.0 CONDITIONING.

5.1 The specimen shall be immediately placed in a forced draft oven for one hour at 35° C.

5.2 At the end of the conditioning time, the specimen shall be turned vertically and any loose aggregate shall be removed by brushing your fingers back and forth across the sample. The specimen shall then be weighed, and the weight shall be recorded to the nearest 0.1g as the *Initial Specimen Weight*. The time from conditioning oven to being placed in the test apparatus shall be no greater than two minutes.

6.0 PROCEDURE. The final specimen weight shall be determined as follows. The specimen is attached with the clamping device. Equilibrate the sample for 180 ± 30 seconds in the clamping device. The brush is secured into the brush head and the brush head with the weight is attached to the mixer. At the end of the equilibrating time, the brush head is put into contact with the sample making sure there is free floating vertical movement of the brush head. The mixer is then turned onto setting #1 (0.83 gyrations per second) for 60 seconds. The sample is removed from the clamping device after the brush head comes to a complete stop. The specimen is held vertically and any loose aggregate is removed by gently brushing your fingers across the sample. The abraded sample is weighed to the nearest 0.1g and recorded as *Final Specimen Weight*.

7.0 CALCULATION. The percent mass loss shall be determined using the equation given below. This equation represents the total mass loss based on the initial aggregate sample weight. The mass loss is given as a percentage of the area exposed to the abrading force.

$$\% \text{ Mass Loss} = \left(\frac{A - B}{A - C} \right) \times 100 \times 1.33$$

Where:

A = Initial specimen weight

B = Final specimen weight

C = Asphalt sample disk weight